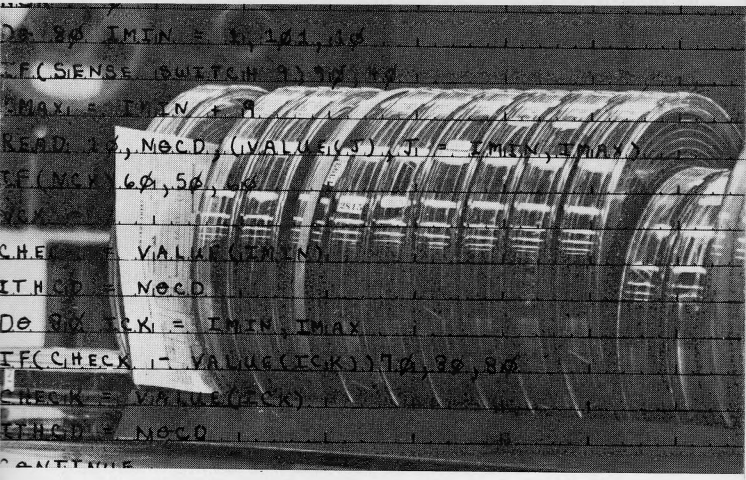
Should you go into

Electronic Computer Programming?

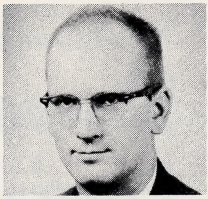
BY DANIEL D. McCRACKEN

As told to Lester David


DO 80 IMIN = 1, 101, 10
IF(SENSE SWITCH 1) 70, 40
IMAX = IMIN + 9
READ 10, NOCD, (VALUE(J), J = IMIN, IMAX)
IF(NOCD) 60, 50, 40
CHECK = VALUE(IMIN)
ITHCD = NOCD
DO 80 ICK = IMIN, IMAX
IF(CHECK - VALUE(ICK)) 70, 80, 80
CHECK = VALUE(ICK)
ITHCD = NOCD

NEW YORK LIFE INSURANCE COMPANY

ABOUT THE AUTHOR



Daniel D. McCracken, a young man in a young field, is one of the nation's leading experts in the art of "talking" to electronic computers and training men and women for the job. As a programming and training specialist, he has been frequently consulted by many of the country's largest corporations utilizing the giant electronic "brains."

Mr. McCracken is the author of 10 textbooks on computer programming, some of which are used in universities here and abroad. He received mathematics and chemistry degrees in 1950 and 1951 from Central Washington State College. In 1958, he formed his own consulting firm, McCracken Associates. Mr. McCracken left the computer field in 1966 to enter Union Theological Seminary in New York to prepare for the ministry.

Electronic computers are performing daily wonders all across America.

These remarkable electronic "brains" are helping with the design and operation of space missiles and vehicles. Computers made the crucial calculations that guided our astronauts in their orbital flights and will help send them to the moon and beyond. They are controlling the operations of huge manufacturing plants, predicting weather, figuring taxes, helping to diagnose illnesses – and even assisting in the creation of newer, more amazing machines!

The fastest computers can perform arithmetic at a top speed of nearly 3 million operations a second. At simple arithmetic, a computer is many thousands of times faster than the human brain.

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One vital fact, however, must be clearly understood about these incredible instruments: *It takes a human being to make them work!*

And because this is so, a major career opportunity has opened up for tens of thousands of young men and women.

This is a specialty career called electronic computer programming, one of the newest and fastest-growing fields in the country today.

Before 1950, programming as a job classification simply didn't exist because electronic computers themselves were hardly more than laboratory curiosities. Now, however, with thousands in use, some 150,000 men and women are launched upon rewarding, challenging and exciting careers.

The coming years will doubtless see an equally spectacular expansion in the versatility and use of these electronic marvels. Indeed many experts predict that we are only on the threshold of the computer age. I can safely estimate that an additional 100,000 programmers will be urgently needed within the next ten years.

WHAT THE PROGRAMMER DOES – Now what, exactly, is the job all about? What are the duties of these programming specialists?

Putting it simply, they tell the machines what to do.

They are the highly trained persons who give precise instructions to the computers to help solve the problems of science, engineering, business and defense. Quite literally, then, they can be called the human brains behind the electronic brains.

Programming must be done in a special way, but before exploring the technique more completely, let us take a closer look at the electronic computers themselves.

The machines range from the size of a small television set to huge ones that can fill a large living room. The most elaborate types may cost up to $10,000,000 each, however, most companies lease them by the month.

Although computers may vary widely in design and operation, all consist of five basic sections:

The input unit, where instructions and data are received.

The arithmetic unit, capable of high-speed electronic calculating.

The memory unit, where many thousands of numbers and instructions can be stored for recall in a few millionths of a second. Back-up storage of magnetic tapes or drums can hold millions of data items that are not needed on such quick demand.

The control unit, which sees that the orders given to the machine are carried out in their proper sequence.

And finally, the output unit, where the answers emerge.

PUTTING THE COMPUTER TO WORK – There it stands, large and imposing, its steel cabinets gleaming and part of its complex circuitry visible behind glass panels. How is it put to work?

A problem arises at a plant. It is given to the programmer, who studies it carefully to work out the best and most logical way of arriving at a solution. He brings to his task a knowledge of physics, mathematics, engineering or business administration, depending upon the area where he is working.

When he has determined upon an approach, the programmer reduces the problem to a step-by-step procedure – a precisely defined series of elementary operations. After organizing these basic operations, he translates each step into a special language, or code, that his machine can read. The instructions are then fed into the computer.

This set of fundamental operations constitutes his program, and is the very heart of his job.

The program is all-essential because, for all its vaunted miracle-working, a computer does not really "solve" problems at all. The machine can only carry out the operations a human brain orders it to perform.

As soon as these orders are received, the machine goes into action. The arithmetic unit calculates at fantastic speed. The memory unit produces the exact information called for. With the control unit opening and closing the circuits in proper sequences, the machine completes its task and delivers its answers at the output.

How valuable are these answers? They are helping science, industry, business and many branches of the U.S. Government do their work more swiftly and efficiently than ever before.

Suppose a new type of aircraft is on the drawing boards. Engineers want to know how strong every part must be to withstand any combination of stresses encountered in flight. The problem is programmed and the engineers receive a complete set of statistics describing how each essential section will behave under all possible conditions. It would take months, perhaps years, to get the same results by human calculations.

Computers supply manufacturers with the latest information on supply and demand of their products, enabling them to carry just the right amount of inventory. Many gas, electric and telephone companies have computers programmed to calculate and issue monthly statements. Among the most important users of computers are banks and life insurance companies. Because of their speed in handling a tremendous volume of paper work, computers have enabled life insurance companies to give policyowners better and faster service at lower cost. Computers also permit economical research for product development and they assist top management in making decisions in some of their most complex problems.

The government uses computers to prepare weather forecasts faster and more accurately than man can possibly manage, to maintain inventories of supplies used by the armed forces, to keep track of all the millions receiving Social Security payments, and for many other purposes. Did you know that computers form an integral part of the great defense network guarding our nation from nuclear attack?

And one of the key figures in all this is the individual who "talks" to the giant computer, giving it jobs to accomplish.

QUALIFICATIONS AND TRAINING – What kind of person makes a good programmer? You needn't be a scientist, engineer or mathematician, although training in these areas is certainly helpful. Interestingly enough, those now engaged in the work came from a wide variety of fields. Some are former astronomers, school teachers and accountants, others were English majors, law students and salesmen.

Although their training has been diverse, all good pro-

grammers possess this one quality in common – *the ability to solve problems in an orderly, logical manner.*

It is important to know that girls are welcomed. Already many talented women are active as programmers, some in high positions, and many more are needed.

You can start preparing for a career in programming as early as high school. Programmers generally work in one of two basic areas – science and engineering, or business. If your preference tends toward the former, take as many mathematics and science courses as you can. For business programming, commercial subjects plus some math and science are valuable.

While a college degree is not essential, most companies do prefer graduates. Most schools now have at least a course or two in programming, and a few allow specialization in computer techniques leading to degrees. Excellent preparation would consist of a degree in mathematics, science, engineering or business administration.

Upon graduation, you may work for a company that manufactures computers, one that utilizes the machines, or for the U.S. Government. In almost all cases, you will receive training in computer techniques after being hired.

REWARDS AND SATISFACTIONS – Financial rewards are excellent and, because the field is new and uncrowded, advancement possibilities are better than in most other areas.

A college graduate may start at $7,000 to $8,000 a year and move upward within a few years to more complex assignments. He may also enter related areas of computer research, product development, market analysis and the like. As supervisor of a programming team or manager of an entire computing operation, he can earn between $12,000 and $25,000 annually, sometimes more.

Since programming gives him an intimate picture of many phases of a business, he can also be tapped for executive assignments in other departments. Many former programmers are now in top management posts.

There are intangible satisfactions, too. Every programmer I know gets a special thrill out of pondering an involved problem, "talking" to a huge machine about it and having the machine talk back – with the right answer. I certainly

do! The glow of accomplishment is especially keen because we all know that vast sums, and even human lives, may be at stake.

Nor is programming a lonely kind of office job. Frequent conferences with other department representatives are necessary and trips into the "field" – an oil refinery, aircraft plant, missile site – are not unusual.

Of course, it's not a career for the person seeking vigorous, outdoor, physically active work. And you should know that some of the tasks can be routine. Hours, too, can be erratic. You may have to work nights and even week-ends on occasion to get a job done.

But it is a career of constant challenges, stimulation and, above all, change. Electronic computers are already helping to revolutionize business methods, industry and science, and their future possibilities are as limitless as man's imagination.

The programmer, from his front-row seat, will not only see but participate in this onward march.

For additional information, write to:

American Federation of Information Processing Societies

345 East 47th Street

New York, New York 10017

A word to parents:

HOW TO HELP YOUR YOUNGSTER HAVE THE CAREER HE WANTS

Many factors will enter into your youngster's choice of a career: his interests, his ambitions, his abilities, the counsel he receives from teachers, friends and family. But, most of all, it will depend on his opportunities to get the training he needs to enter the field of his choice.

Even though his college days are still years away, it's never too soon to start making sure that your youngster will have the opportunity to continue his education when the time comes.

Your New York Life agent has chosen as his career the business of helping families plan for the future — for education, for retirement, for all of the things which life insurance helps make possible. Through training and experience he has become a highly qualified specialist. You'll find him both able and willing to help you.

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